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**Child labour, cobalt, and the London Metal Exchange: fetish, fixing,
and the limits of financialization**

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Child labour, cobalt, and the London Metal Exchange: fetish, fixing, and the limits of financialization

This article considers the surprising, tentative, emergence of the London Metal Exchange as a quasi-labour regulator following persistent scandals over cobalt mined by child labour in the Democratic Republic of the Congo (DRC). It argues that this case offers us a useful window on the limits to financialization. The ‘financialization’ of cobalt here refers to the process by which cobalt has come to be traded as a speculative asset. Such processes have often been understood in terms of a ‘divorcing’ of value from the underlying material form. The persistence of controversies around child labour and cobalt highlights particularly clearly how fraught a process any such divorce is. Theoretically, the article develops these arguments through engagements with Marxian and Science and Technology Studies (STS) literatures on commodification.

Keywords: financialization; child labour; cobalt; London Metal Exchange; historical materialism; science and technology studies

Introduction

In August of 2016 and again in November of 2017, Amnesty International (AI) issued reports highlighting labour abuses, particularly the prevalence of child labour, in cobalt mining in the Democratic Republic of the Congo (DRC) (AI, 2016; 2017a). These reports drew attention to links between the cobalt mining boom in the DRC and the ubiquity of lithium-ion batteries in smartphones, laptops, and (increasingly) electric cars. They were echoed by major media reports (e.g. CNN, 2018). Amnesty’s reports place a considerable emphasis on tying child labour in the DRC to high-profile consumer brands. ‘Naming and shaming’ lead firms is, of course, a well-worn tactic for activists seeking to highlight labour abuses in global supply chains (see Barrientos, 2013; Fransen and Burgoon, 2012). These kinds of pressure have continued with respect to cobalt mining. In late 2019, a Washington-based human rights advocate launched a lawsuit against Apple, Microsoft, Dell, and Tesla seeking compensation for child labour and other abuses in cobalt mining for eventual use in their batteries on behalf of mining communities (Kelly 2019).

The AI reports and wider controversy around child labour in cobalt mining have also had some surprising consequences, though. This article focuses on one of these: from 2017, the London Metal Exchange (LME) suddenly found itself under pressure to screen cobalt traded on the exchange for child labour. This is somewhat puzzling given the LME has not been the target of any of these reports -- mentioned precisely once by Amnesty, and then only as a source in a footnote about cobalt prices (AI, 2017a: 16n13). Yet, over the 18 months following the second AI report, it was the LME developing, negotiating, and starting to implement ‘responsible sourcing’ guidelines for cobalt, and eventually other minerals as well.

In one sense, as an *ad hoc* private governance arrangement adopted in response to scandal, the LME’s efforts here resemble previous existing private forms of governance of child labour and other forms of hyper-exploitation in global supply chains (see Phillips and Mieres, 2015; Graz *et al.*, 2020), and contribute to a further proliferation of actors involved in private labour governance (see e.g. Fransen and LeBaron 2018). However, the role of an exchange with little direct exposure to consumer pressure, not

targeted by activists, and with no audit or consultancy services to sell, is unusual. This article thus asks: why has the LME come to play the role that it has in governing child labour in the DRC? With what implications?

I argue that the explanation, both for why the LME has sought to regulate labour practices in cobalt supply chains and the mechanisms it has chosen for doing so, lies somewhat paradoxically in the limits to the financialization of cobalt. The ‘financialization’ of cobalt refers to the processes by which pricing and distribution of cobalt come to be dominated by its use as a speculative asset. The financialization of commodities in this sense has often been understood in terms of the ‘divorcing’ of speculative value from the material form of the physical commodity (see Knox-Hayes 2013). In what follows, I show how the pressure on the LME to regulate the labour practices through which cobalt is produced calls into question how easily any such divorce of speculative profit from material production can be enacted. It’s precisely because the role of financial markets in the pricing and distribution of cobalt is contested, and because the production of abstract cobalt amenable to speculation is a fraught process, that the LME has been pushed into efforts at governing the relations of production through which cobalt arrives at the exchange, rather than simply ensuring the material consistency of the metal itself. In this sense this article contributes to a small but growing literature on the limits to financialization (see Bernards 2020; Christophers 2015a; French *et al.* 2011; Ouma *et al.* 2018; Montgomerie and Tepe-Belfrage 2017).

Theoretically, the article develops these arguments by drawing together insights on processes of commodification from Science and Technology Studies (STS)-influenced literature and from Marx and recent Marxian writing. While sometimes taken as radically divergent perspectives (e.g. Fine 2003), there have previously been notable calls for more productive engagements between these branches of scholarship (e.g. Castree 2002; Kirsch and Mitchell 2004; Christophers 2014). This argument is developed further in the first section below, but in general I take as a useful point of departure that recent STS literature emphasizes the fraught nature of processes of commodification, highlighting dynamics of fixing, standardization and abstraction, carried out by bundling together devices, infrastructures, routines, and modes of calculation, as well as the necessary tendency of these practices to ‘overflow’ (*per* Callon 1998). These accounts are, however, often narrowly focused on the array of devices and standards through which homogenous commodities are produced and rendered tradeable. This can come at the expense of attention to the underlying social relations, especially the exploitation of labour, through which material things arrive at the ‘market’ in the first place. On this point, Marx’s (1990) notes on fetishism and the commodity form are particularly useful. Taken together, these points suggest a focus on the troublesome processes of commodification and fetishization required for objects to be rendered subject to market circulation. This perspective helps us to understand both the LME’s role in this case, and the actual contents of the set of standards ultimately adopted by the LME. These ultimately aim to establish the standardized, abstract character of cobalt traded on the exchange, by effectively delegating decisions about acceptable labour practices to ‘the market’.

The article develops this argument in three steps. The first section outlines these theoretical arguments in greater detail. The second section considers the difficulties faced by the LME in establishing markets for cobalt. The next section returns directly to

the central puzzle, considering how these dynamics have shaped the unfolding of controversies over child labour and cobalt mining, and regulatory responses to them, starting with the Amnesty reports in 2016 and 2017.

Markets, commodities, and financialization

There is a growing literature on the financialization of commodities. Quantitative studies have traced increasing volatility and intercorrelation of mineral commodity prices, driven in no small part by increasing participation of institutional and portfolio investors in spot markets, a boom in exchange-traded funds (ETFs) tracking commodity prices, and the growth of derivatives on commodity prices (Bashak and Pavlova, 2016; Cheng and Wong, 2014). Equally, studies focused on wider extractive industries have highlighted cycles of boom and bust accelerated by the prioritization of shareholder value, with rapid expansion during price booms followed by rapid restructuring, mine closures, and layoffs when prices collapse (de los Reyes, 2017; Parker, *et al.* 2017; Bowman, 2018).

It's common to talk about these and other processes of financialization as entailing, among other things, the separation of speculative profits from the 'real' or 'material' objects being traded. Knox-Hayes (2013, p. 121), for instance, argues as such explicitly, noting that in the conversion of a physical commodity into a financial asset, 'the commodity is divorced from its materiality, from its "real" space and time and abstracted as a defined certificate'. This is reflective of a wider tendency to talk about the creation of financial assets and markets as involving various means separating value from material form. Financial markets are perpetually dependent on the 'decomposition of things into their attributes' (Bryan and Rafferty, 2016). This is also reflected in wider references to the 'decoupling' of financial profits from productive activities, *per* Krippner's (2005) widely cited definition, or to 'profiting without producing' in Lapavistas' (2013) terms, insofar as it rests on a presumed separation of 'financial' from 'real' activities. I use the term 'divorcing', in Knox-Hayes' (2013) sense, throughout the article mainly because this reference to 'divorcing' is the one of most explicit and deliberate assertion of a more general tendency in the literature on financialization, especially in relation to the formation of new financial assets.

The key point in this article is that the example of child labour and the LME suggests that any such 'divorcing' is prone to failure. The divorcing of financial profit from 'real' production has patently *not* been achieved, in the case of cobalt traded on the LME, if the exchange is being pressured to regulate production. What we need here, then, are means of interrogating how divorcing takes place, and where it might fall apart.

Fixing things: Standardization and market-devices

It's useful to start here from the emphasis in much recent STS scholarship on the construction of markets and market devices. Çaliskan and Callon observe that markets are dependent on the fixing of boundaries between 'the "things" to be valued and the "agencies" capable of valuing them' (2010, p. 5) — a 'disentanglement' which is greatly facilitated when 'a commodity has undergone specific processes of standardization that transform it into an entity described in both abstract and precise terms, and guaranteed by a series of textual and material devices' (2010, pp. 7-8; cf. Muniesa *et al.* 2007, p. 4; cf. Collectif CSI, 2017). Creating commodities out of mundane materials, in short, requires a set of physical transformations and metrics that enable the production of standardized, uniform, interchangeable objects.

But abstract values created through processes of fixing and standardization, as Callon (1998) in particular argues, are inevitably a ‘fragile, artificial result based on considerable investments’ (251) which have an inherent tendency to ‘overflow’. Reductive framings, of necessity, can only capture some aspects of the object. I show further below, for instance, how in the first instance the creation of a financial asset out of cobalt has depended on the fixing in place of specific standards, which were contested in a number of different ways. For the moment, it’s worth noting that this initially took the form primarily of physical and technical standards around purity, volume, and delivery times -- or, in short, around standards aimed at producing homogenous and interchangeable lots of cobalt against which speculative bets could be placed. The resurgence of child labour as an issue suggests that technical standards, in and of themselves, weren’t adequate as means of fixing in place the ‘disentanglement’ of tradeable objects.

But we hit a bit of an impasse here, on two levels. On one hand, STS analyses, as even sympathetic analysts have argued, have generally struggled to account for dynamics of power and exploitation in financial markets (see Erturk *et al.*, 2013; Christophers 2014; Bernards and Campbell-Verduyn, 2019). Equally, a narrow emphasis on devices and standards leaves us with a somewhat limited understanding of *why* and *how* such processes overflow or fail, or of what’s at stake in such failures. Both of these problems are particularly salient in the present case, which is precisely concerned with how remote relations of production and exploitation continue to impinge on the operations of financial markets.

Commodities, labour, and fetishism

On the above point, Marx is helpful (*cf.* Cahill, 2020; Christophers, 2014). Harvey observes -- in terms not entirely distant from Caliskan and Callon’s (2010) -- that a key paradox interrogated across Marx’s work is ‘how the freedom and transitoriness of living labour as a process is *objectified* in a *fixity* of both things and exchange ratios between things’ (2006, p. 37, emphasis in original). The ‘fixing’ of commodities in this sense requires, simultaneously, that the concrete labour through which a commodity is produced is embodied in the form of the commodity itself, and also that labour as such is obscured and abstracted as a result: ‘The mysterious character of the commodity form consists therefore simply in the fact that the commodity reflects the social characteristics of men’s [sic] own labour as objective characteristics of the products of labour themselves, as the socio-natural properties of these things’ (Marx, 1990, p. 165). The way that ‘dead/past labour’ in this sense is rendered inert, embodied in commodities, and hence obscured or fetishized through circuits of exchange is an important point of emphasis in a number of previous analyses drawing together Marx’s notes on the commodity with STS and cognate reflections (e.g. Francescone, 2018; Kirsch and Mitchell, 2004). Critically, Marx helps grasp how this process is fundamentally contradictory -- labour is always embedded in circulating commodities even as the commodity form obscures the concrete labour processes undergirding it. A number of previous authors have emphasized the ways that navigating this tension depends on particular forms of public and private regulation, particularly configurations of social property relations and ownership (see Christophers, 2015b; Cahill, 2020).

Here it’s useful to emphasize that this tension is both inherent in capitalist social relations and the base condition for speculative profits. Marx argues that it is precisely

the basic tension between the objectification of abstract labour in the commodity form and the concrete labour that produced it that makes possible speculative gains. In the potential for fluctuations in price without changes in underlying conditions of production lies ‘the demonstration of the fact that the particular individual labour contained in a commodity has first to be expressed through the process of alienation in terms of its counterpart, i.e. as impersonal, abstract, universal, and, only in that form, social labour viz. money’ (Marx 1904, p. 81; 1990, p. 196). It’s because the fixing and objectification of labour in the commodity form itself is an inherently contradictory process, rather than any distinctly financial divorce between material and value, that speculative profits are possible (*cf.* Bernards, 2020). Insofar as speculative profits appear to be divorced from productive activities they represent ‘the capital *mystification in its most flagrant form*’ (Marx, 1991, p. 516, emphasis added).

This formulation shares more than a little ground with Callon and Caliskan’s (2010) observations on the fixing and standardization of objects as pre-requisites of market circulation. What’s critical is that Marx positions the commodity fetish as being undergirded not only by techniques of measurement and standardization, but also by the whole circuit of social and political relations through which labour, capital, and commodities are mutually produced and reproduced. This invites considerations both of the configurations of social and property relations articulated across space which enable commodities to reach ‘the market’, and of the ways in which acts of exchange can fetishize and obscure them (*cf.* Christophers, 2014; Cahill, 2020). This is helpfully complementary, rather than inconsistent, with an emphasis on the specific routines and devices through which the homogenous, fixed character of the commodity is maintained. Taken together, we’re left with injunctions to focus on the tensions implicit in the negotiation of devices and standards, and on how these intersect with underlying relations of property and production through which things arrive at the market as commodities. In the next section, we can see both sets of issues colliding in the development of cobalt markets.

Fixing and fetishizing cobalt at the LME

Three issues, highlighted by the above-described approach, are prevalent in the financialization of cobalt. We can point, in the first instance to efforts to homogenize and fix in place standardized ‘cobalt’ to be traded on the exchange. Second, these have been frustrated by shifting supply chain geographies in which end-users and intermediate processors have struggled for control over a comparatively scarce mineral in the midst of a boom in demand. Finally, these fluid conditions, in combination with more localized conditions in the south-eastern DRC where cobalt deposits are largely found, create the conditions for the circulation of cobalt mined with child labour.

Pricing controversies

First, efforts to establish pricing mechanisms, physical standards, and infrastructures enabling speculative trading in cobalt have not been unproblematic and have generated controversies of their own. Driven by growing demand for cobalt for use in portable electronics and electric car batteries, prices boomed after about 2015. The official cash settlement price for LME Cobalt contracts grew fairly steadily from under USD 24 000/tonne at the beginning of 2016, to 43 232.50 in February 2017, to 81 125 by February 2018. The period also saw increased trading volumes on the LME. In the first two months of 2016, 620 lots of cobalt were traded; the equivalent figure for the first

two months of 2017 was 2 396 (Home, 2017). A number of specialized trading funds have also been established in the last three years, seeking to profit from price rises in cobalt. One of the largest stockpiles of cobalt at the time of the AI report on 2017, for instance, was held by Cobalt 27, a Canadian firm established in 2017 expressly to buy and hold physical cobalt stocks. It raised CAD 200 million through a public listing on the Toronto Stock Exchange in June of 2017, and subsequently purchased 2 160.9 metric tons of cobalt held in LME warehouses (Cobalt 27, 2017, p. 2).

Here it's worth considering the kinds of standardization and fixing underpinning this development. In order to be tradeable, cobalt needs to be suitably homogenized to allow any unit held in an LME warehouse to be interchangeable with any other. The main mechanism by which this homogenization is assured is through the LME's process for certifying producers for delivery against LME contracts. LME cobalt contracts give the owner the right to delivery of a lot of 1 metric tonne of cobalt of a minimum purity of 99.80 percent, held in an approved warehouse. The homogeneity of tradeable cobalt here is achieved through standards on the size and form of containers 'only steel drums with ring sealing closure are permitted and are to be of a net weight capacity of 200kgs or 250kgs or 500 kgs that allow for uniform size to be delivered against the LME contract of 1 metric ton' and the chemical purity of the cobalt itself (LME, n.d., p. 3). The other standards applied by the LME in certifying brands relate primarily to corporate governance. These are oriented primarily towards prudential concerns, aimed at preventing the scenario where a contract fails because a refiner goes out of business. Companies must have been in operation for at least twelve months prior to applying and must be ISO 9001 certified.

We can see a process of 'disentanglement' of the kind described by Çaliskan and Callon (2010) at play here. The LME's standards work to produce interchangeable physical products meeting specific generic standards, packaged in easily divisible units, and reliably deliverable at specified times. This turn to market trading as a means of establishing prices for cobalt was nonetheless contested and somewhat fragile. The LME's trading standards work to enable the discovery of 'true' prices through the market exchange of identical and interchangeable materials. Prior to the LME's initial listing of cobalt contracts in 2010, benchmark cobalt prices were largely set by trade publication Metal Bulletin, based on a twice-weekly industry survey. Metal Bulletin has continued to publish benchmark prices. It has also routinely publicized concerns about the LME market, noting in particular that trading on the LME 'does not allow buyers to specify cobalt brand, impurity limits or location of the material', and that while users 'accustomed to spot purchasing of physical metal... may price off the LME, their traditional suppliers will continue to provide them with material specific to their production' (Ritzema, 2014).

There's a tension here, then, between the fixed, generic cobalt needed for speculative trading and the potential variability of actual needs in production. This tension is reflected, moreover, within the LME itself, which has faced continued internal debate over whether it should continue to target industrial users or make reforms to draw in more purely speculative traders (see Seddon 2020). The LME was bought by Hong Kong Clearing and Exchanges in 2012, part of a wider process of demutualization, concentration, and marketization of exchanges (see Petry 2020). The LME has come under pressure to offer a wider and more flexible range of futures and options contracts,

as well as new forms of electronic trading, in order to attract hedge funds and larger traders and bolster trading volumes (see Sanderson and Hume 2017; Seddon 2020).

Changing geographies of production

Alongside the shifting standards, pricing mechanisms, and exchange infrastructures reflected above, there are material struggles for control over cobalt, sitting at the intersection of inter-state competition, changing technology, and shifting property relations. Some reports suggest that demand for cobalt is likely to exceed known reserves if projected shifts to renewable energy sources are realized (Dominish *et al.*, 2019). This has taken place alongside a dramatic concentration of cobalt refining in China, where roughly 50 percent of global refining now takes place. The considerable majority of DRC cobalt exports go to China, and Chinese refiners have expanded interests in mining and trading ventures in the DRC (see Gulley *et al.* 2019). There has also been a wave of concentration and consolidation among Chinese cobalt refiners since 2010 (Lin 2011). The largest refiners -- Yantai Cash and Jichuan Group from 2010, Huayou and GEM since 2017 -- are certified for delivery against LME contracts.

In the midst of increased concentration at the refining stage, several major end users including Apple, Volkswagen, and BMW have made initial efforts to establish long-term contracts directly with mining houses in early 2018 (Ochiai, 2018). This would not only threaten cobalt turnover at the LME, but also call into question the LME's central role in price setting (and hence its viability as a trading venue for speculative traders seeking 'exposure' to cobalt price risks). In the first instance, then, the networks of property relations and exchange necessary for cobalt to arrive at the exchange are subject to contest. Speculative trading is potentially limited by struggles for control over material cobalt itself -- suggesting that any 'divorcing' of value from material has been achieved partially, if at all.

We can see the material impacts of these struggles in the drop of trading volumes in 2018 and 2019. Trading on the LME peaked in March of 2017 with over 2 500 lots traded. Prices began to drop in early 2018 amid growing concerns about child labour, falling back to around USD 35 000 a tonne. Trading volumes on the LME also began to lag -- with 1 074 lots traded over the first two months of 2018, less than half the figures from the previous year (LME, 2018a). This was partly a result of the child labour allegations in the Amnesty reports, but also arguably reflective of the fragility of the LME's position in the first place. The 'market' for cobalt as such was always much smaller and less liquid than those for more established minerals. In the same month that cobalt volumes peaked in March 2017, for instance, more than 3 million lots of copper were traded. Groups like Cobalt 27 have also remained exceptional. The handful of exchange-traded funds seeking 'exposure' to cobalt and battery components more generally, for instance, have all done so through holding stocks in mining houses rather than trading in physical cobalt or futures. Indeed, by mid-2019, Cobalt-27 was forced to sell off its cobalt stockpile at a loss and buy out shareholders (Friedman 2019), and was subsequently bought out by its largest shareholder (a Swiss-registered investment firm) and restructured into 'Conic', an investment fund holding a portfolio of royalty-bearing interests in battery metals operations rather than physical metals.

Table 1: Cobalt brands certified for delivery against LME contracts, 2017

<i>Company Name</i>	<i>Based</i>	<i>Description</i>
Vale Canada Ltd	Canada	Canadian subsidiary of Brazil-based mining group; world-leading nickel producer, significant copper producer.
Sumimoto Metal Mining Co. Ltd	Japan	Multinational metal miner and refiner; nickel and copper producer.
Jinchuan Group Co. Ltd	Hong Kong	Multinational metals mining and trading group; operates Ruashi Copper and Cobalt mine in DRC, Chibuluma Copper Mine in Zambia since acquisition of South African miner Metorex in 2012; significant portion of income from metals trading.
Freeport Cobalt Oy	Finland	Major cobalt refinery, subsidiary of US-based Freeport McMoRan, dedicated supply arrangement with related company joint venture Tenke Fungurume Mine in DRC.
Compagnie De Tifnout Tiramine (CTT)	Morocco	Refinery, subsidiary of Moroccan-based Managem group.
Yantai Cash Industrial Co. Ltd	China	Refinery, established 2002, processes ores sourced in DRC.
Chambishi Metals Plc	Zambia	Refinery, currently owned by Eurasian Natural Resources Corporation PLC, sold during privatization of state-owned Zambia Consolidated Copper Mines.

Another key obstacle is precisely the tension between the fluidity and variability of the actual concrete labour embodied in cobalt and the fixity and homogeneity needed to render cobalt tradeable. When the second AI report was published in late 2017, seven suppliers were approved for delivery against LME cobalt contracts (see Table 1). Two of these (Vale Canada Ltd and Sumimoto Metal Mining Co. Ltd) were longstanding copper and nickel miners with substantial in-house refining operations. These were also the only two of the seven listed brands not to source cobalt primarily from the DRC. This is roughly reflective of the global distribution of cobalt production and reserves -- roughly 70 percent of total production in 2018 and 2019, and half of estimated global reserves, are in the DRC (USGS 2020: 51). A further two approved brands (Freeport Cobalt Oy and CTT) were refineries operating as subsidiaries of larger mining groups (Freeport McMoRan and Managem Group, respectively). The former relies on cobalt sourced from Tenke Fungurume Mine (TFM) in the DRC, a joint venture of parent company Freeport with Gécamines. The latter's mining operations at present are mainly in Morocco, but a joint copper and cobalt mining venture with Chinese-based Wanbao Mining in the DRC is expected to begin production in 2019. Jinchuan Group Co. Ltd was a Hong Kong-registered integrated trading house and mining company, whose major mining operations were acquired from South African miner Metorex in 2012. The final two suppliers were standalone refiners, without ownership ties to mining operations. Chambishi Metals is a Zambian refinery sold off during the privatization of Zambia Consolidated Copper Mines, it has changed hands several times, but was owned by a Kazakh-based private company (Eurasian Natural Resources). It sources cobalt

concentrates from TFM. The remaining approved firm, China-based Yantai Cash Industrial Co., lacked ownership ties to mining operations and had less clearly defined supply arrangements than other listed refiners. In the period since the AI reports were launched, the number of approved cobalt brands has in fact expanded and the proportion of content sourced from the DRC increased, with the remaining major Chinese refiners, GEM (Jiangsu) Cobalt and Huayou Cobalt, among others being listed.

Child labour and cobalt in the DRC

As a result, the cobalt traded on the LME arrives there through a highly variegated and somewhat opaque set of relations of production and exchange. The organization of production in the DRC is of particular interest here, both because of its overall predominance and because it has been the main focus of complaints about child labour.¹ The recent rise in demand for cobalt has driven a boom in cobalt mining both by large-scale industrial installations and by small-scale miners. Deposits in the DRC are not simply larger, but also include far more shallow ores than elsewhere. They are thus both cheaper to exploit for major mining firms and accessible to small-scale artisanal miners with limited capital or equipment (see Sovacool 2019).

Importantly, the rise of artisanal mining in the DRC copperbelt is relatively recent, typically associated with the collapse and subsequent privatization of parastatal copper miner Gécamines (Cuvelier, 2017; Rubbers, 2017). In widely reported figures, in 1988, Gécamines produced roughly 450 000 tons of copper, and employed 30 000 people; by 2003, production had fallen to 8 000 tons and workers were owed up to 36 months of back pay. As part of the restructuring and privatization of the company, more than 10 000 workers were offered severance payments financed by the World Bank, the company was privatized, and mining rights were increasingly marketized (Rubbers, 2017; World Bank, 2009). By most measures, mining communities in the Congolese Copperbelt are marked by widespread poverty deepened by the collapse of the mining industry. A 2017 survey found mean and median monthly household incomes of USD 34.50 and USD 14, respectively, in the region (Faber *et al.*, 2017). It is very common for household livelihood strategies to draw on multiple sources of income, often including agriculture and various forms of petty trading alongside mining work (see Rubbers, 2017; Cuvelier, 2017).

In the context of widespread dispossession, the DRC's relatively shallow cobalt deposits have been an important source of livelihood activities. Estimates based on survey research suggest that roughly 60 percent of households in the region derived some income from mining, of which 90 percent worked in some form of artisanal mining (Faber *et al.*, 2017). Artisanal mines have consistently made up an estimated 15-20 percent of cobalt production in the DRC. Despite the recent emergence of a number of large-scale industrial mines, artisanal mining continued to produce more cobalt than any single industrial mine in 2015 (see Sovacool 2019: 923). The spread of artisanal mining has also been facilitated by the widespread entry of traders making it possible for small-scale miners to circulate raw cobalt into global supply chains – albeit usually

¹ What follows is of necessity a highly condensed picture of a very complex landscape. It draws from a growing literature on the political economy of cobalt mining in the DRC, including Sovacool (2019), Katz-Lavigne (2020), Banza Lubabu Nkulu *et al.* (2018), as well as around mining in the region more generally (see Radley 2020; Rubbers 2020).

with steeply discounted prices paid to miners themselves (see Faber *et al.*, 2017; Banza Lubabu Nkulu *et al.* 2018; Sovacool 2019).

There have been some limited efforts by the DRC government to address unsafe working conditions, particularly child labour, in cobalt mining -- notably a 'National Strategy' to combat child labour in mining announced in 2017 (Ministère des Mines 2017). However, these have generally lacked significant commitment of resources either for enforcement of existing standards (e.g. labour inspectorates) or for development programming to address underlying vulnerabilities. In practice they explicitly focus as much on promoting the international image of the sector as on actually eliminating child labour. The basic conditions under which cobalt mining in the DRC is carried out lend themselves to the incorporation of materials produced by child labour into global supply chains. As one consultant report notes, artisanal mining and industrial mining take place in the same locations, and materials from different sources are typically blended at the refining stage (RCS Global, 2016, p. 8).

There's a tension here. As noted above, speculative trading on the LME is dependent on the fixing and homogenization of material cobalt. In the case of cobalt, this involves objectifying radically different forms of concrete labour in identical, interchangeable lots, or even within the same lot. This tension has been made particularly clear by the Amnesty reports on child labour in the DRC. The first report, published in 2016, suggested that child labour was widespread in artisanal mining, with child workers frequently exposed to abuse and dangerous or unhealthy working conditions (AI, 2016). The report assigned a considerable degree of responsibility for these conditions to failures on the part of the DRC government: 'There is a significant lack of capacity within governmental agencies to monitor and enforce safeguards and improve conditions for artisanal miners' (AI 2016, p. 7). It also pinpointed one Chinese firm as a principal pathway by which materials from artisanal mines using child labour found their way into global production networks:

One of the largest companies at the centre of this trade is Congo Dongfang Mining International (CDM). CDM is a 100% owned subsidiary of China-based Zhejiang Huayou Cobalt Company Ltd. (Huayou Cobalt), one of the world's largest manufacturers of cobalt products. Operating in the DRC since 2006, CDM buys cobalt from traders, who buy directly from the miners. CDM then smelts the ore at its plant before exporting it to China. There, Huayou Cobalt further smelts and sells the processed cobalt to battery component manufacturers in China and South Korea. In turn, these companies sell to battery manufacturers, which then sell on to well-known consumer brands. (AI, 2016, p. 8)

The report names Apple, Dell, HP, Huawei, Lenovo, LG, Microsoft, Sony, Vodafone, Daimler, Volkswagen, and Chinese automaker BYD as probable end-users of Huayou Cobalt products. The 2017 report places considerably more emphasis on the global value chain for cobalt, focusing primarily on the limited actions taken by end-users and alleging failures of due diligence by the same consumer brands highlighted in the previous report (AI, 2017a). As noted in the introduction, neither report gives much attention to the role of the LME.

Despite not being targeted directly, however, the LME has been a major focal point of the response to the AI reports precisely because its position was already fraught and somewhat contested. In the context of the growing contestation over the pricing and distribution of cobalt highlighted in the previous section, emergent concerns about child labour in cobalt posed specific threats to the viability of LME's cobalt trading

operations. Even prior to the second AI report, cobalt on the LME traded at a discount to the Metal Bulletin price through the summer of 2017. Several major industrial groups, including Volkswagen, expressed concerns about ‘tainted’ cobalt trading on the LME and asked suppliers to ensure that no child labour was used in the supply chains of listed brands (Desai and Daly, 2018).

The critical point for the moment is that rendering cobalt into an object of speculative trading has deepened and reinforced the work of abstraction required to subject it to commodity relations. This certainly involves mundane processes of standardization and material transformation, but is also especially fraught and prone to overflows because the networks of property relations and exchange needed to deliver cobalt to the market, and the labour relations involved at the extraction stage, are fluid and contested. Marx’s notes on commodity fetishism are thus particularly useful here: commodification requires simultaneously that abstract human labour be embodied in the products of labour, and also that the specific concrete labour through which those commodities were produced be hidden from view. These tensions are perhaps especially acute in financialized settings, but this tension is rooted in the commodity form more generally. This has played a particularly important role in the development of ‘responsible sourcing’ rules at the LME.

Restoring the commodity fetish? The LME governs child labour

In this final section, I argue that we can usefully understand the LME’s quasi-regulatory response to these reports of child labour as efforts to restore the commodity fetish. Paradoxically, by promising certain kinds of transparency, ‘responsible sourcing’ guidelines work to restore the objectification and abstraction of labour embedded in cobalt.

Following the release of the second AI report in the fall of 2017, LME launched an investigation of supply chain practices at certified cobalt brands. The LME requested reports from all certified brands by 1 December 2017, and issued a statement suggesting that ‘We have strict guidelines for brands wishing to list their products on the LME. Any evidence of sub-standard practices that fall short of our requirements would be investigated by the LME and action would be taken’ (Barrera, 2017). This was welcomed by Amnesty, ‘Reports that the London Metal Exchange is demanding that companies source cobalt responsibly, and that it has launched an investigation into of one them, are welcome - these would be important steps towards ensuring that companies aren’t profiting from human rights abuses’ (AI, 2017b). Initial statements from the LME suggested that the exchange would seek to ‘ban’ materials mined using child labour (Desai and Daly, 2018). According to one LME board member interviewed by Reuters, ‘The LME has to be policeman. It can do that by making sure industry standards on child labour and conflict minerals are being met, that there is auditing and certification’ (qtd. Desai and Daly, 2018).

The LME published a draft paper on ‘Responsible Sourcing’ in late 2018. The paper acknowledges a need to expand the LME’s product standards to include a wider range of non-chemical requirements:

The LME has a central role to play because its brand listings are seen as the standard for metals producers. The Exchange has traditionally viewed these standards as being technical and metallurgical in nature; however, it must realise

that society now demands more and expand the scope of LME standards to matters of corporate social responsibility. (LME 2018b, p. 18)

It is worth underlining here that, while the LME plays no role in directly setting standards, this ‘policeman’ role requires a good deal of discretion in terms of *which* standards to enforce. In practice, particular emphasis has been placed on Organization for Economic Cooperation and Development’s (OECD) guidelines on minerals supply chain management, as well as emerging standards initiatives coming from industry associations (see below). The OECD’s guidelines here were agreed after consultations including participation from states in the Great Lakes region of Africa (including the DRC) in 2011-12. They are primarily focused on monitoring procedures, and explicitly voluntary (OECD, 2016, p.16), consisting of a set of guiding principles on best practice with respect to managing conflict risks and human rights abuses in mineral supply chains. The broad thrust is that companies should be monitoring mineral supply chains for risks of human rights abuses and subjecting practices to independent audits. Critically, the OECD guidelines don’t contain specific definitions of ‘human rights’ or set standards specific to child labour (e.g. minimum working ages, restrictions on tasks), but instead focus on the processes by which firms monitor activities across their supply chains. The LME’s initial proposed guidelines essentially involved applying OECD disclosure and due diligence standards across all products, with more stringent auditing requirements for ‘high risk’ metals. LME listed brands are divided up into ‘potentially’ and ‘automatically’ ‘higher-focus’ metals -- with cobalt and tin among the latter. According to the proposed standard, cobalt and tin brands traded on the LME would be required to submit annual audits for compliance with the selected standards, while listed brands for other materials would be assessed annually to identify red flag cases where audits might be required (LME, 2018b, p.23). The 2018 report also identified a set of ‘transitional’ provisions for cobalt. While the report leaves time for implementation of sourcing standards elsewhere, with respect to cobalt ‘the LME remains conscious of the specific market concerns in respect to cobalt, and the consequently more time-sensitive nature of responsible sourcing requirements for this particular metal’ (2018b, p.25). This was an explicit response to persistent price differentials between LME cobalt and that from reliably ‘responsible’ sources in the physical market (2018b, p.25).

Cobalt posed a distinctive challenge for the LME insofar as creating a speculative market depends on the homogenization of the materials traded. The report emphasized the ‘seller’s market’ character of the exchange. Since contracts traded on the exchange entitled the borrower to delivery of a generic lot of cobalt held in any LME warehouse, rather than a specific one from a specific place, sellers were incentivized to deliver their lowest quality materials first. Since buyers are aware of this, the expectation is that prices will converge on the lowest quality materials listed for delivery, in this case, those carrying reputational risks associated with child labour. As a result, the LME (or, indeed, any exchange market) is not able to differentiate between the various brands on its market, and the presence of a brand with characteristics disliked by the market (including a failure to properly embrace responsible sourcing requirements) will hence result in the LME price falling to reflect the discounted value of this least valuable brand. (LME, 2018b, p.26)

The solution identified in the short-to-medium term was a process by which the LME would identify ‘low-value’ brands believed to be trading at a discount, with the power to de-list low-value brands under some circumstances.

This particular character of the LME as a ‘seller’s market’ also had a notable impact on the way in which the exchange responded to feedback from market participants on the position paper. Notably, there was some debate among respondents about whether adherence to specific standards should be required, or simply transparency and evidence of gradual improvement. This position was rejected by the exchange, again with the reasoning that exchange prices would converge on the ‘least desirable’ brands:

the seller is economically incentivised to deliver the least desirable metal onto the Exchange and, because the LME price is discovered on the basis of such deliveries, that price will tend to converge to the value of this brand. If brands which have made less progress in respect of their responsible sourcing work are considered to be less valuable than those which are well advanced... this is likely to be the metal used in delivery on the Exchange, and it therefore has the potential to mean the LME price trades at a meaningful discount to metal in the “real-world”. (LME, 2019a, p.14)

Minimum standards for sourcing in this reading thus become imperative for the maintenance of ‘accurate price discovery’ (LME, 2019a, p.14). The proposed ‘responsible sourcing’ regime thus seeks to restore the commodity fetish by promising some, limited kinds of transparency which in fact obscure as much as they reveal. The promise is that materials that reach the market have been screened according to a threshold standard for ‘due diligence’, and can thus be presumed to be reflective of the ‘true’ market value of the metal.

The limits of transparency

There are real limits to these processes in terms of their likely impacts on labour rights in particular and questions of ‘sustainability’ more generally. Questions of accountability, enforceability, and evasion -- which have been persistently raised about the application of private voluntary standards and audit regimes to labour governance (e.g. LeBaron *et al.*, 2017; Keonig-Archibugi, 2017) -- seem likely to be particularly problematic here. It’s a notable problem in this respect that the LME focuses primarily on disclosure and auditing requirements and process standards rather than setting substantive requirements about labour or environmental conditions in production and refining. Equally, the main mechanism for accountability here is the spread between the LME price and prices in physical markets for cobalt. To some extent, and particularly under the transitional arrangements, it’s up to ‘the market’ to determine what kind of disclosure and audit regimes are acceptable. As Christophers (2015b: 86) aptly notes, delegating decisions to an anonymous, depersonalized market ‘ultimately conjures an accountability black hole’.

The proposed rules have also been structured in such a way that it is unlikely any firms will be found to be in violation. Yantai Cash, which unlike other refiners certified for delivery against LME contracts does not own mining operations or transact primarily with related companies, came in for particular scrutiny in 2017, and so is a salient example here. Chinese trading house Nanjing Hanrui, one of Yantai Cash’s primary suppliers, was highlighted in both AI reports. Nanjing Hanrui was also a significant focus of subsequent discussion, particularly after making media statements that it was ‘not yet possible to judge whether there is a risk of child labour’ in its DRC operations (Desai and Daly, 2017). In the aftermath of the reports, however, Yantai Cash appears likely to have effectively met the LME’s requirements. Yantai Cash announced shortly after the second AI report that it was launching an audit of its supply chain in the DRC (Jeune Afrique, 2017). Chinese producers as a group also responded with an increased

emphasis on the ‘Responsible Cobalt Initiative’ (RCI). The latter had been formed by the Chinese Chamber of Commerce of Metals, Minerals, and Chemicals Importers and Exporters (CCCME) in 2016. The RCI was finally launched as a legal entity in December of 2017, with participation from a number of major end users including Apple, BMW, Dell, Sony, and Volvo, along with Chinese traders and refiners including Yantai Cash (PMR, 2017).

Indeed, even setting these issues aside and assuming that the emerging audit regime around cobalt is effectively enforceable, there are distinct limitations to any regime focused on keeping minerals mined with child labour in artisanal mining out of global supply chains. The focus on child labour in artisanal mining reflects a wider tendency to normalize dynamics of exploitation implicit in the ‘normal’ operation of capitalism by singling out the worst forms of irregular labour abuse (see Bernards, 2018). There is a danger that a narrow focus on child labour or other irregular forms of exploitation can both detract from efforts to address the underlying conditions that enable their persistence and occlude the ways in which they are wrapped up with global capitalism (see Phillips and Mieres, 2015). The way that LME sourcing guidelines aim to accomplish this aim of eliminating materials mined using child labour from the exchange -- that is, with a more or less formalized preference for materials from industrial installations rather than ‘artisanal’ sources -- are likely to have mixed benefits at the absolute best for labour and mining communities in the DRC. Recent research has highlighted, for instance, linked the rise of industrial mining installations owned by multinational conglomerates to deepening inequality, driven in no small part by those firms’ preference for expatriate workers in higher paid roles (Rubbens 2020; Radley 2020). Artisanal and clandestine mining remains an important means of securing livelihoods, absent serious efforts to create alternative livelihood strategies its removal may do more harm than good (Katz-Lavigne 2020). Child labour, equally, is far from the only exploitative or destructive practice prevalent in cobalt mining, many of which are not exclusive to artisanal mining -- including significant health risks from breathing dust (not only to miners but also to local communities); ecological disruption and pollution from acid, dust, and tailings; and violent displacement of local communities (see Banza Lubabu Nkulu *et al.* 2018; Sovacool 2019). Similar concerns were raised by a number of NGOs with respect to the LME’s briefing paper: ‘It is short-sighted and irresponsible of the LME to single out cobalt and tin as higher risk metals above others, or to single out ASM material as implicitly higher risk’ (Global Witness, 2019).

The LME removed the specific targeting of materials from artisanal sources in the final version of their sourcing guidelines, published in late 2019 (LME 2019b: 5). But it is nonetheless precisely the risk of buying minerals mined by child labour associated with artisanal mining that upstream buyers were pricing into the discount on LME cobalt. In short, the formal change of rules here is again essentially a deferral of responsibility to the amorphous ‘market’ rather than a concrete step to improve the lot of artisanal miners. This is particularly the case given that these and other pressures are also pushing refiners towards the same policy. Huayou Cobalt, for instance, announced a policy of stopping purchases from ‘individuals’ in May of 2020, partly in response to the US lawsuit noted in the introduction (Sanderson 2020).

In short, the contradictory character of the financialization of cobalt has spurred a series of ongoing efforts at papering over tensions and managing crises, in ways that are articulated around the choke points implicit in the shifting and variegated production networks wrapped up in the process. It is notable that the LME was never targeted directly by activist reports, which (following what is a fairly standard practice for campaigning against labour abuses) focused on pressuring widely-known consumer brands. The fragility of processes of financialization is particularly important in driving these developments. Concerns about child labour carry significant weight with the LME in no small part because they fall on organizations (like Apple, BMW, and Volkswagen) with the resources to establish alternative mechanisms for supply chain organization.

Conclusion

The above discussion has explored the somewhat surprising emergence of the LME as a quasi-labour regulator in cobalt mining. Drawing on engagements with Marxian and STS debates about the construction of markets, the article has linked this development to the limits to the financialization of cobalt. By way of conclusion, I want to briefly reflect on why this case matters.

The preceding discussion, of course, deals with a somewhat unusual and unexpected series of events. There won't necessarily be many direct parallels to other cases. Equally, the systemic importance of this case is potentially limited, particularly if current trends away from explicitly financialized modes of cobalt pricing and distribution continue. Nonetheless, this case reveals dynamics of wider importance, particularly in terms of how we study financialization.

The broader literature on financialization suffers from a lack of attention to cases like this one. It tends, simply put, to focus on cases where new financial markets *have* been built successfully, where financial logics *have* been diffused, where the interests of finance capital *are* prioritized, where financial assets *are* divorced from productive activities -- or worse, to assume without investigating that efforts to build financial markets will be successful. There are of course important questions to be asked what kinds of power relations, ethics, subjectivities, and risks are produced in the process of building financial markets, and how the prioritization of financial returns implicit in the divorce of financial assets from underlying material might skew incentives (see van der Zwan 2014). Yet if we are to take seriously the idea that such markets are not natural, and that their creation is not automatic, the literature on financialization would benefit from considerations of cases where these processes are contested or incomplete. Divorcing financial profits from 'real' economies isn't easy, and we understand these processes better if we look at the places where they fail as well.

Cases where the development of financial markets is visibly difficult might offer up important clues about how financialization works more generally, as well as where its limits lie. This case of child labour on the LME in particular suggests that any divorcing of value from material form, and from underlying social relations of production, is only ever a partial, politically contested achievement (*cf.* Bernards 2020). It is, this paper has argued, better spoken of in terms of fetishization. And, as the LME's struggles to restore the commodity fetish discussed in the latter parts of this article suggest, fetishization is not always easy. As argued in the above, there is productive scope for engaging both with recent literature influenced by STS and with Marxian concerns in highlighting these issues. Making commodities into objects of financial speculation depends on

complex infrastructures and difficult processes of measurement, standardization, and material transformation, all of which have been highlighted extensively in STS scholarship. But the ‘overflows’ inherent on this system depend on contested reconfigurations of supply chains and market relations, and ultimately hinges on the troublesome fetishization of the labour embedded in the objects being traded. We gain a lot from engaging with Marx, both in terms of grasping the sources of overflows and in understanding the processes of exploitation and fetishization underlying any processes of ‘financialization’.

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